An empirical analysis of the dairy farms structure in Poland

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Introduction & Goals

Following the transition to the market economy in 1989 and the accession to the European Union (EU) in 2004, the Polish dairy sector has undergone fundamental adjustments in response to the domestic and external conditions. The adjustments, among others, involved the modernization, ownership transfer, and the exchange of the genetic pool (Urban, 2004; Seremak-Bulge et al., 2005; Szajner, 2009; Bórawski and Kowalska, 2017). As a result, the cow herd size shrunk considerably, while the yield per cow increased, and milk production decreased less than one could expect given the change in cow number. Those trends, which started in 1990, continued after Poland joined the EU.

The purpose of this study is to analyse the changes in the number of dairy farms with the aim to identify the factors that could explain their evolution.

Material and Methods

The methodology used for this study follows Zepeda (1995), who modelled the evolution of dairy farms in Wisconsin based on the aggregated data similar to those available from the Farm Accountancy Data Network (FADN). The model allows taking into account new entrants and movements intra categories (based on economic size categories). All the explanatory variables in the model where introduced in lags.

The model was estimated using FADN data for the period 2004-2017. The economic classes (based on the value of annual commercial sales) were aggregated into three classes: less than 50 thousand Euros (group 1), 50 to 100 thousand Euros (group 2) and above 100 thousand Euros (group 3). FADN provides additional information to create variables for each of the three classes, in particular financial ratios.

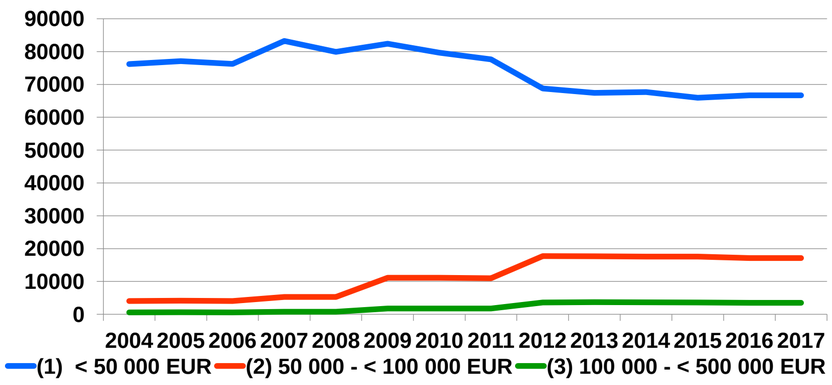
Results

The results indicate that whilst the number of farms in group 1 has decreased, the number of farms of groups 2 and 3 have shown an increase in the number of farms (Graph1). The model indicates that variables that are important to explain the evolution of the number of farms in the three aforementioned groups are the ratios of output to inputs (associated with efficiency), short term debt to total debt (associated with financial liquidity issues) and net-of-taxes subsidies to total output (dependency on subsidies) (Graphs 2-4).

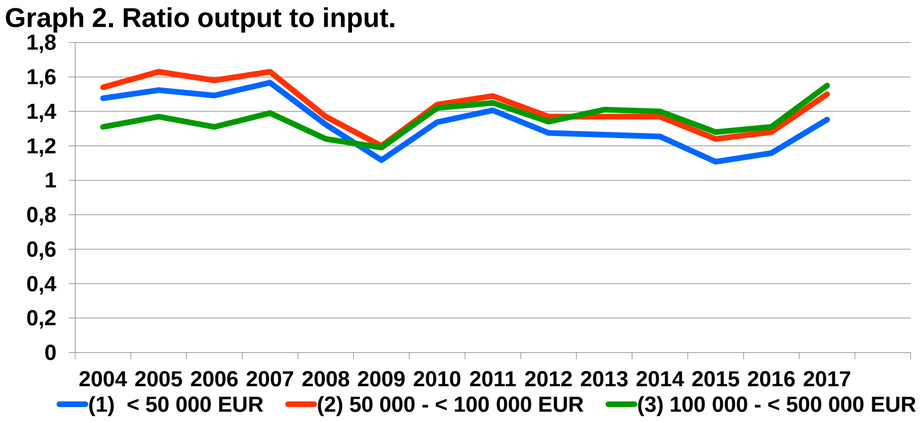
Table 1 presents descriptive statistics of selected variables in years 2004-2018.

The model results allow separating the new entrants in each class and the movement intra class (Table 2).

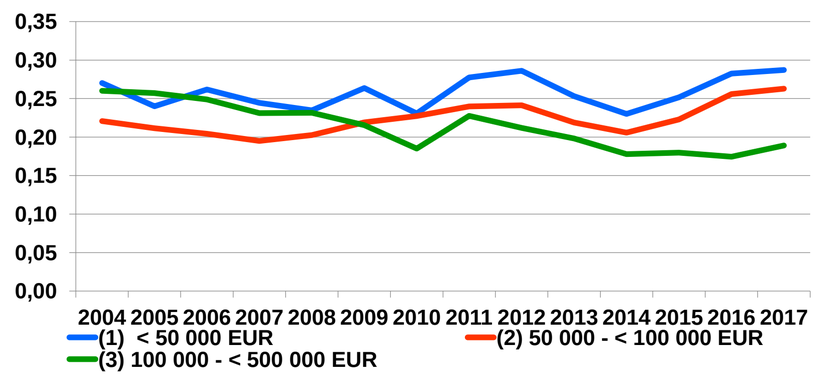
Graph 1. Number of farms.



Graph 2. Ratio output to input.



Graph 3. Ratio short term debt to total liabilities.



Graph 4. Ratio subsidy to total output.

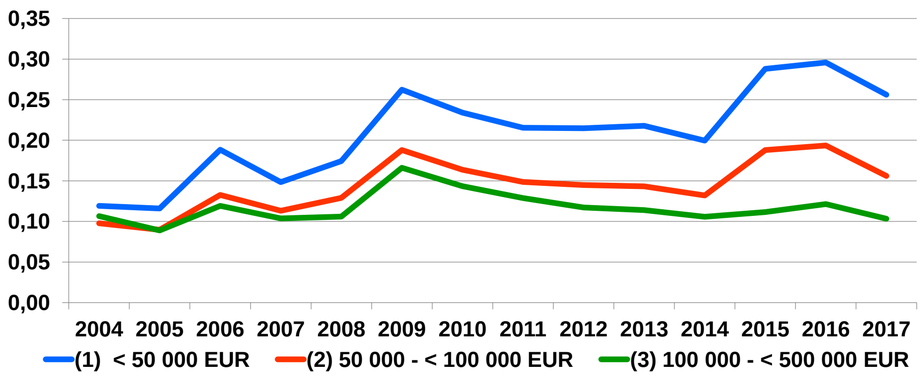


Table 1. Descriptive statistics of selected variables, 2004-2018.

	Farm classes														
	< 50,000 EUR					50,000 - < 100,000 EUR					100,000 - < 500,000 EUR				
	Total output/ Total input	Short term loans	Total liabilities	Balance current subsidies & taxes	Total output	Total output / Total input	Short term loans	Total liabilities	Balance current subsidies & taxes	Total output	Total output / Total input	Short term loans	Total liabilities	Balance current subsidies & taxes	Total output
Mean	1.3	1476.9	5795.7	4791.8	22347.2	1.4	8110.1	36616.4	10796.7	74189.3	1.4	25550.0	117084.7	22059.2	191089.4
Std. Dev.	0.1	494.3	2092.2	1208.5	3352.9	0.1	2599.5	14646.5	1905.1	12361.6	0.1	9922.7	31790.4	3456.2	35728.0
Minimum	1.1	730.7	2768.1	2216.2	17507.6	1.2	4783.0	18131.0	6597.0	56335.0	1.2	14780.0	80627.0	17200.0	139113.0
Maximum	1.6	2295.9	9784.4	6330.7	27879.7	1.6	13047.0	64424.0	13106.0	96307.0	1.5	43984.0	179302.0	28287.0	266625.0

Table 2. Model estimation results.

	Model								
	< 50,000 EUR*			50,000 - < 100,000 EUR**			100,000 - < 500,000 EUR***		
	Coefficient	Std Error	T-ratio	Coefficient	Std Error	T-ratio	Coefficient	Std Error	T-ratio
Intercept	6.3041	2.174	2.899	12.161	3.624	3.356	157.800	42.887	3.680
Ratio of short term debt to total liabilities	0.650	1.053	0.617	-0.774	1.003	-0.772	52.489	14.484	3.624
Ratio net subsidies to output	-0.205	1.004	-0.204	1.764	1.179	1.496	16.173	4.600	3.516
Farm net income	1.409	0.359	3.930						
Farm net value added/AWU	3.997	1.673	2.389						
Farm net value added/AWU	1.546	0.855	1.807	148.740	40.801	3.645			
Average farm capital				2.123	0.136	15.662	-0.475	0.287	-1.657
Gross investment				-0.009	0.623	-0.014	-2.501	1.351	-1.850
Net investment				0.253	0.448	0.565			

*R-Square between observed and predicted = 0.6907

**R-Square between observed and predicted = 0.8245

***R-Square between observed and predicted = 0.8547

Conclusion

The Polish dairy sector has gone through a significant transformation since the country transitioned to a market economy. In addition, policy has been developed to reduce the problem of land fragmentation. In this context, the purpose of this study is to analyses the evolution of the number of dairy farms since 2004 with the aim to identify the factors that could explain it. This was done using the aggregated data from the Farm Accountancy Data Network (FADN) and a model that allows taking into account new entrants and also movements intra categories. The results indicate that the ratios of output to inputs, short term debt to total debt and net-of-taxes subsidies to total output have significantly influenced the change in the number of dairy farms in Poland.

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